

A Dining Chair with Reclining Mechanism**Field of invention**

The present invention relates to a chair having a reclining backrest mechanism that allows reclining movements for extra comfort. In particular, it relates to chairs having substantially upright backrest such as the dining chair, banquet chairs and the like.

Background of invention

Reclining mechanism in chairs enables a user to recline at a certain range of reclination angles upon the user pressing
5 his/her back against the backrest of for instance the dining chair. To provide optimum comfort and ergonomics, extra limb supports members such as armrest and footrest may be fitted with the dining chair. Such supports can also be operatively
20 connected with the reclination mechanism to enable them to be automatically adjusted to a certain predetermined angle in tandem with the reclination of the said dining chair.

A conventional dining chair is designed to have a backrest at an upright position or minimum inclination of a small angle.
25 This is the best-known sitting position of the dining chair design so that the user is at the natural sitting posture or for eating. Posture of the back and neck muscles at an upright sitting position is essential for the stomach muscles to be at the most relaxing condition during food intake if the chair is
30 used for dining purpose.

However, eating is just one of the activities that can happen at dining table. In fact, most of the time we spend at dining table involves in non-eating activities like drinking,

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discussion, meeting, playing card games, family bonding session and so on. Therefore, the upright rigid design of the backrest of a dining chair will provide limited comfort for such activities. Therefore, it is the intention of this invention to address the above-mentioned limitation of a dining chair.

It is therefore an object of the present invention to provide a reclining mechanism for a dining chair to adjust to a user's desirable reclining position.

It is an object of the present invention to provide a mechanism to enable the dining chair to recline and automatically retracts to its originally upright position once the reclining force is removed.

It is a further object of the present invention to provide the necessary mechanism for other attaching components like armrest, footrest of the said dining chair to adjust itself to the range of reclining positions, which is determined by the designer to be at its best supporting position.

These and other objects and advantages of the present invention will be apparent to those of ordinary skill in the art upon inspection of the detailed description, drawings and appended claims.

Summary of Invention

According to the general embodiment of the invention, it is provided a chair with reclining mechanism comprising a sitting base, supported by plurality of legs (wherein the base and legs are collectively referred to herein as the "rigid members" of the chair), a backrest with one end pivotally connected to at least one rigid member. At least one reclining

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means is disposed to connect the backrest to the rigid member; wherein said reclining means allows backrest to adaptably recline according to pressure exerted by a user, and to revert to original position upon removal of said pressure provided
5 that where the reclining means comprises a compressible spring-bias element, said element is arranged to be compressible in any position except along a substantially vertical direction.

10 Preferably, the reclining means includes at least one of a piece of elastic material capable of returning to its original form when the reclining force which is applied to the backrest is removed and components or parts that can be extended or compressed when a reclining force is applied to it by the
15 backrest and is biased to return to pre-stressed form upon said force is removed. The reclining means may be disposed in various ways - part or wholly exposed, completely hidden, embedded within the backrest, hidden within hollow cutouts or inside of the said backrest.

20 In one aspect of the invention, the material used for the reclining means includes elastic polymers, including rubber and plastics. The components used includes any one of a spring-bias element including spring plate, metal plate that
25 is shaped to perform like a spring plate or leaflet spring, and compressible and/or extensible element including pneumatic- or spring-biased telescopic element.

In another aspect, the backrest enables user to recline
30 thereon within a range of reclining angles allowable by the reclining means used. The backrest may extend to form hind legs of said chair and comprises two portions whereby the top portion has a freedom of rotation with respect to the said rigid members, and the bottom portion is connected to said

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rigid members as well as to said top portion by any joint means, wherein said bottom portion serves as legs; and a reclining mean is incorporated in between said portions of the said backrest.

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In one specific embodiment, the reclining means is incorporated in the joint between the top and bottom portions of said backrest, wherein said reclining means comprises elastic means to absorb compression force due to said reclining movement and which will return to its original uncompressed form upon said compression force is removed.

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In another specific embodiment, the reclining means is incorporated in the joint between the top and bottom portions of said backrest, and wherein said reclining means comprises at least a metal spring plate that may be biased to bend due to reclining pressure and reverts back to its pre-stressed position upon said reclining force is removed.

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In yet another specific embodiment, the reclining means is incorporated in the joint between the top and bottom portions of said backrest, and wherein said reclining means comprises a coil spring that is biased upon allowing the top portion of the said backrest to pivotally rotate about said joint with said bottom portion upon receiving reclining force, and said bias returns said backrest to its pre-stressed position upon the reclining force is removed.

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Preferably, the reclining means uses elastics means, including elastic material and/or spring-biased element which may be disposed hidden inside the backrest, housed externally (9), comprises a metal plate hidden inside the said backrest or a coil spring hidden inside said backrest.

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In an alternative embodiment, the backrest comprises two portions that are securely joined together by a supporting means which includes a metal rod inserted inside said backrest and hinged in between said two portions of the said backrest, and wherein said supporting means is capable of withstanding repeated cycles of reclining movements. The sitting base and backrest may include any one or combination of padded, upholstered or bare material.

Preferably, the legs are provided at an appropriate length and affixed at an appropriate angle from the normal of the said sitting base. Preferably, the connection means for holding members comprising the chair includes nuts and bolts assemblies, fasteners, screws, snaps, clamps, clips and like fastening means.

According to one aspect of the invention, a dining chair includes a sitting portion or base, which is supported by plurality of legs, a back supporting portion or backrest, and other seating supporting surfaces, such as armrest, footrest and headrest (collectively referred to as "supporting surfaces"). The legs could be of at any length or angle attached rigidly at any angle by conventional means to the bottom side of the base. The legs could be extended from the backrest for certain embodiments. The base could be of any bare material, padded or upholstered. The back portion or backrest is substantially flat and could be of any bare material, padded or upholstered. The said dining chair could be of plain or incorporated with any external cosmetic enhancing design to improve its appearances to attract buyer. The moveable joints of the said dining chair supporting portion and other seating supporting surfaces that moves when the dining chair is reclined are attached together by attachment means which could be nuts and bolts assemblies,

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fasteners, screws, snaps, clamps, clips or other such equivalents that could be used to secure one surface to another. Only rotational movements with respect to the movements of the backrest are allowed.

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In some embodiments, the backrest is made of single piece of material or one piece of same material that was cut into two to accommodate reclining mechanism. The reclining mechanism could be attached to the backrest or one end attached to the backrest and another to the rigid member, the said mechanism could be exposed, hidden or hide at some undercuts or internal side of the base or the back rest or both. Means of reclining mechanism could be made of rubber, spring, spring plate, steel plate, cantilever plate or any engineering materials that inhibits high yield properties that is capable of returning to its original size and shape after the reclining force is removed. Advantageously, the reclining mechanism enables the users to relax their back in a range of angles while remain sitting at the dining table.

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In some embodiments, the attachment of the said reclining mechanism could be hidden or embedded inside a the back rest, example utilizing a spring plate or one of the above mentioned means of reclining mechanism, could be used to hold the backrest which is cut into two and enable the top part to have the freedom of rotation when a reclining force is applied. In another words, the bottom portion of the backrest is pivoted against the base and top portion is allowed to rotate with respect to the bottom portion. For other said external reclining means, example a spring with one end attached to the base and another end is attached to the back rest, this will also enable the recline mechanical movements, but in terms of appearance the latter design is consider less attractive. However, means of reclining mechanism do not limited to the

example stated but could extend to the used of any materials that contain property of that will restrain energy and capable of retracting to its original form immediately after the release of reclining pressure, for example synthetic elastic material.

Brief description of the drawings

Fig 1 shows a part side view of a reclining dining chair in upright position when zero pressure is applied to its backrest.

Fig 2 shows a part side view of a reclining dining chair in reclined position pressure is applied to its back rest.

Fig 3 shows a part of the backrest that is cut into two parts to incorporate the installation of reclining mechanism of any means. It could be in any form of flexible joints as illustrated in the diagrams. The form of the cut or separation slit can be at angle, straight or round as illustrated in the diagram.

Fig 4 show a part of the backrest, which is in one complete piece but could also offer reclining feature that incorporate reclining mechanism by any means.

Fig 5 shows various designs of reclining dining chair using different reclining mechanisms.

Detail Description of embodiments

Fig 1 illustrates one embodiments of the reclining dining chair, having a base (3), for supporting a user with normal body weight. In this embodiment, plurality of legs (4) is

attached to the said base to raise the base to a certain height from the floor. The legs and the sitting base are attached together by connection means to form a rigid members of the chair. The connection means could comprise of nuts and bolts assemblies, fasteners, screws, snaps, clamps, clips or other such equivalents that are normally use to secure two furniture parts together rigidly. The chair method of construction and its assembly method in this invention can be similar to general assembly procedures and method of a normal dinning chair, which usually consist of sitting base, backrest and legs. Or in same cases, the chair can have extra members like armrest and footrest. In another exemplary embodiment, legs are attached at certain angle to adjust for height as well as enhance the design of the dining chair. Backrest (1) could also be extended to reach the ground and serve as legs. The novel part of this invention is the installation method as well as location of a reclining mechanism unto the chair structure to enable the user to enjoy reclining movements. The uniqueness and innovative installation or incorporation of this reclining mechanism has made this chair to be special and different from all prior arts. This mechanism will allow user to recline the backrest of the chair to a range of angle which force is applied to the back rest and upon the removal of the force to the back rest, the said back rest will immediately revert to its original position again. The connection and the installation method of the reclining mechanism will be described in later paragraph. Backrest to support the back of user is shown here as one piece, other design which enable various reclining mechanism (2) is described later.

In the embodiment shown in fig 2, the backrest of the dining chair is reclined when the user applies pressure (5) to the backrest. There is a maximum distance that is allowable by the design and usually is determined by the reclining angle and

has direct dependency on the means of the reclining mechanism. There is a stopper incorporated to prevent any further reclining once the maximum allowed reclining distance is reached. The installation method and location of the stopper is depending on the type of reclining mechanism used.

For example; for the design (9) shown in Fig 5, an elastics material such as rubber is installed in a housing at the rear of the backrest to enable the reclining mechanism, a block that is made of solid material which is dimensioned to be same as the maximum distance of the reclining position, can be attached on the top of the said elastic material. For this exemplary design, once the elastic material is squeezed and reaches the allowable maximum distance, the stopper will prevent the said elastic material to be squeezed any further and acts like a stopper. For each individual design, the installation method, the installation of the location of the stopper as well as the means of stopper can be different from each other. However, for every design, the backrest will immediately retract to its original position once such force is removed. The rate of reversion is depending on the means of the reclining mechanism installed.

Fig 3 shows a part of the backrest that is cut into two parts to incorporate the installation of reclining mechanism means. It could be in any form of flexible joints, the form of the cut or separation slit can be at angle, straight or round. The reclining mechanism could be made of spring or rubber which including synthetic material with elastic property. The said mechanism could also made of spring plate, spring bar, coil spring or any material that inhibits high elasticity property that could be incorporate in this invention under various designs.

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In one embodiment, the reclining mechanism could be embedded inside an undercut or hollow section within the backrest. For example, for the design with backrest that it cut into two portions as illustrated in Fig 3, the abutted part has a hollow section or cut out inside the backrest where both portions of the backrest are joined, the hole or cutout is just large enough to house the reclining mechanism. For example, in order to fit a spring plate into the middle of the abutted part on a backrest that is made of two part, a hole that has the dimension of the spring plate has to be cut from both parts, each end of the spring plate is inserted into the respective hollow section of the backrest and joined those parts together. Sometimes, extra adhesive has to be used to ensure a proper fixing of that mechanism. In this embodiment, the most obvious advantages is the appearance of the dinning chair, as both joints and reclining mechanism is invisible, line of cut will look seamless, for this aspect, the size of the intersection line of two part depends on the quality of workmanship. Once those parts are joined, it is ready to be assembled with the rest of the chair members to form a reclinable dining chair.

Dinning chair that made of single piece of backrest can also be incorporated with reclining mechanism as shown Figure 4, this installation method and location is different from the design that was described in the previous paragraphs. Figure 4 shows the exemplary of a backrest consisting of one single piece can be made reclined by means of attaching a spring (8) or other means that will enable it to revert to its original position once the force is removed. For example, spring and lever with controlled distance of extension are some of the most common mechanism used for this. In the example where the spring is used to enable the reclining mechanism, one end of the said mechanism is connected by connection means to the

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backrest and other end is connected by connection means to the rigid member of the dining chair, usually the base of the chair is preferred. In this embodiment, the backrest will recline once the user applies a force on the backrest. For this example, the said stopper that is used to control the distance of the reclining, for example could be made of a plate with a slot that has a certain dimension equivalent to the maximum allowable reclining distance; the plate can be fitted together with the spring with one end being connected to the backrest and the other end being connected to the rigid member of the dinning chair. The connection means could be made of nuts and bolts assemblies, fasteners, screws, snaps, clamps, clips or other such equivalents that are normally use to secure two parts together rigidly. However, for higher end and more sophisticated product that requires reliability and appearance, it is preferred to use high-grade engineering material for this purpose

In another embodiment, means of reclining mechanism that enable the backrest to recline at a certain angle when force is applied to the back rest can be embedded or build inside the backrest for backrest design that is consisting of two pieces or parts. This design is usually more popular as the incorporated hidden type of reclining mechanism will also contribute to the appearance of the said dining chair. However, there are many ways to incorporate the reclining mechanism unto a dinner chair, but emphasis has to be focus on the control of the range of reclining angle as well as reliability of the mechanism in terms of wear and tear.

An alternate embodiment of the present invention comprises of the use of spring plate, rubber, steel plate and cantilever to enable reclining mechanism together with different method of installation and connection means. For different design it is

also important to ensure a controlled reclining angle by using some stopping means to prevent over stretching of the reclining mechanism. For each method of installation and types of the reclining means, different method of installation of the stopper is required. Fig 5 illustrates some of the examples that a reclining mechanism could be installed to a dining chair, example includes both embedded type of design as well as those exposed type of design. In the example shown in (9), where the reclining means is housed at the back of the backrest, the said reclining means could be made of spring or rubber which including synthetic material with elastic property. The reclining means can be secured onto its location by adhesive material or a screw. The stopper could be, for example a block that is made of solid material, which is dimensioned to be same as the maximum allowable distance of the reclining position, can be attached on the top of the said elastic material. For this exemplary design, once the elastic material is squeezed and reached the allowable maximum distance, the stopper will prevent the said elastic material to be squeezed any further and will act effectively as a stopper. Therefore, for each individual design, the installation method and location of the stopper can be different from each other. The backrest will immediately revert to its original position once such force is removed. The rate of reversion is depending on the means of the reclining mechanism installed.

The design shown in example (10) wherein the installation of the reclining mechanism is in the backrest which is hidden inside the backrest, this could be achieve by using reclining means such as metal plate or engineering plastics that has equivalent performance as metal plate. One end of the plate is inserted unto the top portion of the backrest and the other is inserted unto either the base or the bottom portion of the

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backrest. The reclining means can be further secured by some sort of screw or pin to lock it unto its intended location as well as holding both parts of the backrest together. In the example shown in (11), the reclining means (11) such as spring or cylinder, is connected to the end of the backrest and the inner part of the legs; such design has a visible reclining mechanism. The backrest is pivoted at a distance for one end on the side of the rigid base with the spring connected at the end of the backrest. The other end of the spring is connected unto the rigid members of the chair. Once the reclining movement or force is applied unto the backrest, the spring will be extended and enable the reclining motion. The spring will revert and pull the backrest back to its original position once the reclining force is removed.

In the example shown in (12), the reclining mechanism (12) is embedded inside the backrest, the backrest will recline once the user applied certain force onto the backrest. This exemplary design will give the effect as the backrest is rotating at a pivoted point on the backrest. For this exemplary design, a coil spring can be used to enable the reclining mechanism whereby the backrest has to have a hollow cut out to house the coil spring. The coil spring will allow the top portion of the said backrest to rotate at certain point of rotation with respect to the said bottom portion due to the reclining movement and the coupling force from the said coil will force the top portion of the backrest to return to its original position once the reclining force is removed. In the exemplary design shown in (13), a reclining means is installed at the back of a cut out portion of the backrest, which enables the back rest to recline by absorbing the compression force that is applied unto the reclining means from the reclining movement. A rubber, engineering plastic, compression spring, spring plate or any means that has elastic

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property can be installed at the location shown at (13). Once the reclining pressure or force is removed, the releasing force from the reclining means will force the backrest back to its original position. Example shown in (14) uses the same theory but this design has the mechanism located externally at the bottom of the base of the chair.

In another embodiment shown in Fig 6, the said backrest that is made of two portion is further supported and joined strongly together by a supporting means (15) for example a steel hinge, that is strong enough to withstand repeated cycles of reclining movements wherein the supporting means is inserted inside the backrest and hinged in between the two portions of the said backrest with a point of rotation (17), the backrest is incorporated with a rubber means or any plastics elastios means that is installed inside the backrest. The supporting means can be further locked onto its intended position on the backrest by a pin (18).

Alternatively, the present invention comprises the use of other engineering material that inhibits high yield properties that can be embedded inside the backrest to enable reclining mechanism.

Preferred and alternate embodiments of the present invention have now been described in detail. It is to be noted, however, that this description of these specific embodiments is merely illustrative of the principles underlying the inventive concept. It is therefore contemplated that various modifications of the disclosed embodiments will, without departing from the spirit and scope of the invention, be apparent to persons skilled in the art. For instance, it is obvious the one skilled in the art of the present invention

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that alternate embodiments of the present dining chair can include different shape and means of reclining mechanism.